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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/720,762	11/25/2003	Tae-gyu Chang	Q77359	2773

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EXAMINER	
GODBOLD, DOUGLAS	
ART UNIT	**PAPER NUMBER**
2626	

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
3 MONTHS	04/11/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Office Action Summary	Application No.	Applicant(s)
	10/720,762	CHANG ET AL.
	Examiner	Art Unit
	Douglas C. Godbold	2626

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on 25 November 2003.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) 1-17 is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) 1-17 is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on 25 November 2003 is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.

4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .

5) ☐ Notice of Informal Patent Application

6) ☐ Other: _____.

DETAILED ACTION

1. This action is in response to application 10/720,762 filed November 25, 2003. Claims 1-17 are pending in the application and have been examined.

Priority

2. This application claims priority to Korean Patent Application No. 2003-2718 filed January 15, 2003. This priority date has been considered in this office action.

Claim Rejections - 35 USC § 112

3. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

4. Claims 8 -10 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

5. Claim 8 recites the limitation "the predetermined threshold" in line 24 of the claim. However it is unclear as to what predetermined threshold this refers. Further it is unclear if the total bit allocation of the frame is changed or just the global gain. Appropriate correction is required.

6. Claims 9 and 10 are rejected as they are dependent on claim 8.

Claim Rejections - 35 USC § 101

7. 35 U.S.C. 101 reads as follows:

> Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

8. Claims 15 and 17 are rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter. Claims 15 and 17 claim a computer-readable recording medium that is defined in the specification to include carrier waves. Carrier waves are non-statutory matter as defined by 35 U.S.C. 101, causing claims 15 and 17 to be non-statutory as well.

Claim Rejections - 35 USC § 102

9. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

10. Claims 4, 5 are rejected under 35 U.S.C. 102(e) as being anticipated by Subramaniam et al. (US Patent 6,950,794).

11. Consider claim 4, Subramaniam teaches a method of shaping quantization noise, comprising:

during compression of an audio signal at a predetermined bit rate, determining whether quantization noise of a plurality of frequency bands falls below a threshold

noise level calculated in a psychoacoustic model (Mask thresholds 31 in figure 4 are received from psychoacoustic models; column 8, lines 10 - 13. At block 33, the minimum scaling (A_{sfb}) required for each scale factor band is determined such that the distortion for a given band is less than the corresponding mask value; column 8, line 13. Distortion is quantization noise.); and

if the quantization noise of the plurality of frequency bands does not fall below the threshold noise level, shaping the quantization noise of the plurality of the frequency bands to be substantially equal to the threshold noise level, at or within an offset error (figure 4 shows a bit allocation method where scale band factors are used to shaped the noise in the subbands; column 8, lines 4- 52. Noise shaping is done when scale factors are applied, step 34. A minimum scaling is used, column 8 line 14, which would make the noise substantially equal to the threshold level.).

12. Consider claim 5, Subramaniam teaches the method of claim 4, wherein the quantization noise of the plurality of frequency bands is shaped by adjusting a scale factor band gain (At block 33, the minimum scaling (A_{sfb}) required for each scale factor band is determined such that the distortion for a given band is less than the corresponding mask value; column 8, lines 13 - 16. Scaling is the same operation as adjusting the scale factor gain.).

Claim Rejections - 35 USC § 103

13. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

14. The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

15. Claims 1-3 , and 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Subramaniam et al. (US Patent 6,950,794) in view of Kawahara (US Patent 6,697,775).

16. Consider claim 1, Subramaniam teaches a method of shaping quantization noise (figure 4), comprising:

receiving a predetermined quantization noise threshold allowed during quantization of sampled audio data (mask thresholds 31 are received from psychoacoustic models; column 8, lines 10 - 13) and quantization noise energy information of quantized MDCT coefficients of a plurality of frequency bands of an audio

frequency range (this would be included in transform coefficients, called distortion in this reference); and

attenuating quantization noise energy of quantized MDCT coefficients of the plurality of frequency bands (figure 4 shows a bit allocation method where scale band factors are used to shaped the noise in the subbands; column 8, lines 4- 52.), wherein differences between the predetermined quantization noise threshold and the quantization noise energy of the quantized MDCT coefficients are relatively large (This algorithm is would inherently attenuate the quantization noise in bands where the quantization noise is higher than the noise threshold.)

However Subramaniam does not specifically teach that this algorithm is carried out on a predetermined number a plurality of frequency bands.

In the same field of audio coding, Kawahara teaches attenuating a predetermined number a plurality of frequency bands (figure 5 shows only subbands 0-15 are selected for psychoacoustic allocation means; in figure 6, only 0-7 are selected.).

Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to only apply the psychoacoustic allocation as taught by Subramaniam to only a select number of bands, as taught by Kawahara, in order to increase coder efficiency (Abstract, Kawahara).

17. Consider claim 2, Subramaniam teaches the method of claim 1, wherein the predetermined quantization noise threshold is calculated in a psychoacoustic model (Thus, the process begins at figure 4, blocks 30 and 31 by receiving the transform

coefficients of the analog samples and the predetermined masking thresholds provided by the psychoacoustic model; column 8 line 10.).

18. Consider claim 3, Subramaniam teaches the method of claim 1, wherein the quantization noise energy is attenuated by increasing a scale factor band gain (At figure 4, block 33, the minimum scaling (A_{sfb}) required for each scale factor band is determined such that the distortion for a given band is less than the corresponding mask value; column 8, line 13. Scaling is the same operation as adjusting the scale factor gain.).

19. Consider claim 15, Subramaniam teaches a computer-readable recording medium for recording a computer program code for enabling a computer to provide a service of executing a quantization noise distribution adjustment method (The present invention may be implemented on a data processing system by providing suitable program instructions, consistent with the foregoing disclosure, in a computer readable medium; column 9, lines 26 - 29), the service comprising the steps of receiving a predetermined quantization noise threshold allowed during a quantization of sampled audio data (mask thresholds 31 are received from psychoacoustic models; column 8, line 10) and quantization noise energy information of quantized MDCT coefficients of a plurality of frequency bands of an audio frequency range (this would be included in transform coefficients, called distortion in this reference) and attenuating quantization noise energy of quantized MDCT coefficients of the plurality of frequency bands (figure

4 shows a bit allocation method where scale band factors are used to shaped the noise in the subbands; column 8, lines 4- 52.), wherein differences between the predetermined quantization noise threshold and the quantization noise energy of the quantized MDCT coefficients are relatively large (This algorithm is would inherently attenuate the quantization noise in bands where the quantization noise is higher than the noise threshold.)

However Subramaniam does not specifically teach that this algorithm is carried out on a predetermined number a plurality of frequency bands.

In the same field of audio coding, Kawahara teaches attenuating a predetermined number a plurality of frequency bands (figure 5 shows only subbands 0-15 are selected for psychoacoustic allocation means; in figure 6, only 0-7 are selected.).

Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to only apply the psychoacoustic allocation as taught by Subramaniam to only a select number of bands, as taught by Kawahara, in order to increase coder efficiency (Abstract, Kawahara).

20. Claims 6, 7, 11-14, 16 and 17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Subramaniam et al. in view of Kawahara as applied to claim 1 above and further in view of Najafzadeh et al. (Perceptual Bit allocation for Allocation for Low Rate Coding of Narrowband Audio).

21. Consider claim 6, Subramaniam teaches a method of shaping quantization noise, comprising:

if the total quantization noise of the quantized MDCT coefficients is less than the sum of the quantization noise thresholds (this is merely an indication there is enough bits to properly code the frame with no audible artifacts), attenuating quantization noise of a plurality of frequency bands (figure 4 shows a bit allocation method where scale band factors are used to shaped the noise in the subbands; column 8, lines 4- 52.),

But does not specifically teach: if the total quantization noise of the quantized MDCT coefficients is greater than the sum of the quantization noise thresholds, attenuating the quantization noise in selected frequency bands of the plurality of frequency bands, nor

calculating a total quantization noise of quantized MDCT coefficients and a sum of quantization noise thresholds calculated in a psychoacoustic model;

comparing the total quantization noise of the quantized MDCT coefficients with the sum of the quantization noise thresholds.

In the same field of audio coding, Kawahara teaches if the total quantization noise of the quantized MDCT coefficients is greater than the sum of the quantization noise thresholds (this is merely an indication there are not enough bits to properly code the frame with no audible artifacts), attenuating the quantization noise in selected frequency bands of the plurality of frequency bands (figure 5 shows only subbands 0-15 are selected for psychoacoustic allocation means, figure 6, only 0-7 are selected.).

Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to only apply the psychoacoustic allocation as taught by Subramaniam to only a select number of bands, as taught by Kawahara, in order to increase coder efficiency (Abstract, Kawahara).

But neither of these references teaches calculating a total quantization noise of quantized MDCT coefficients and a sum of quantization noise thresholds calculated in a psychoacoustic model;

comparing the total quantization noise of the quantized MDCT coefficients with the sum of the quantization noise thresholds.

In the same field of audio coding, Najafzadeh teaches calculating a total quantization noise of quantized MDCT coefficients and a sum of quantization noise thresholds calculated in a psychoacoustic model and comparing the total quantization noise of the quantized MDCT coefficients with the sum of the quantization noise thresholds (page 895, the section titled "total audible distortion technique" shows a bit allocation method where the total distortion of the frame is found by summing the distortions in each subband. This has the same result as comparing a total noise to a total threshold. Bits are allocated to reduce the audible distortion the most.).

Therefore it would have been obvious at the time of the invention to choose a bit allocation based on the total distortion as taught by Najafzadeh with the coding method of Subramaniam and Kawahara in order to provide an efficient encoder with minimal audible distortion.

22. Consider claim 7, Subramaniam teaches the method of claim 6, wherein the attenuating the quantization noise of the plurality of frequency bands comprises:

calculating a number of bits corresponding to a predetermined bit rate determined for compression of an audio signal and then setting the number of bits with an adjustment of a common gain until a number of bits smaller than the calculated number of bits are used for coding (figure 4, global gain is set initially in block 35, and reduced in block 40 if necessary as determined by number of bits in block 39. See column 8, lines 4-52.); and

adjusting a scale factor band gain to adjust a degree the quantization noise is attenuated in the plurality of frequency bands (if the distortion is greater than the mask, block 20, scale factors are increased in block 21. Column 8, lines 4-52).

23. Consider claim 11, Subramaniam in view of Kawahara in view of Najafzadeh teaches the method of claim 6, wherein in the attenuating of the quantization noise in the selected frequency bands, a scale factor is adjusted in a predetermined number of frequency bands according to a ranking of noise-to-mask ratios of scale factor band gains of the predetermined number of frequency bands in which the quantization noise of the quantized MDCT coefficient is greater than the quantization noise threshold of one of the predetermined number of frequency bands in the psychoacoustic model. (Page 895, the section titled "total audible distortion technique" discusses allocating bits to each band depending on how much it reduces the total distortion. In this way bits are

obviously allocated to bands with the greatest noise to mask ratios in order to reduce the overall distortion by the greatest amount.).

24. Consider claim 12, Subramaniam teaches an apparatus for adjusting a quantization noise distribution (figures 5 and 6), comprising:

a quantization noise attenuator that attenuates quantization noise of the plurality of frequency bands (figure 4 shows a bit allocation method where scale band factors are used to shaped the noise in the subbands; column 8, lines 4- 52.),

But does not specifically teach:

a quantization noise calculator that calculates a total quantization noise of a quantized MDCT coefficient and a sum of quantization noise thresholds calculated in a psychoacoustic model;

a noise attenuation algorithm selector that compares the total quantization noise of the quantized MDCT coefficient with the sum of the quantization noise thresholds to determine whether a quantization noise attenuation is performed in a plurality of frequency bands or in selected frequency bands of the plurality of frequency bands;

a band selective quantization noise attenuator that attenuates quantization noise in the selected frequency bands.

In the same field of audio coding, Kawahara teaches a band selective quantization noise attenuator that attenuates quantization noise in the selected frequency bands(figure 5 shows only subbands 0-15 are selected for psychoacoustic allocation means, figure 6, only 0-7 are selected.).

Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to only apply the psychoacoustic allocation as taught by Subramaniam to only a select number of bands, as taught by Kawahara, in order to increase coder efficiency, (Abstract, Kawahara).

But neither of these references teaches a quantization noise calculator that calculates a total quantization noise of a quantized MDCT coefficient and a sum of quantization noise thresholds calculated in a psychoacoustic model;

a noise attenuation algorithm selector that compares the total quantization noise of the quantized MDCT coefficient with the sum of the quantization noise thresholds to determine whether a quantization noise attenuation is performed in a plurality of frequency bands or in selected frequency bands of the plurality of frequency bands.

In the same field of audio coding, Najafzadeh teaches a noise attenuation algorithm selector that compares the total quantization noise of the quantized MDCT coefficient with the sum of the quantization noise thresholds to determine whether a quantization noise attenuation is performed in a plurality of frequency bands or in selected frequency bands of the plurality of frequency bands (page 895, the section titled "total audible distortion technique" shows a bit allocation method where the total distortion of the frame is found by summing the distortions in each subband. This has the same result as comparing a total noise to a total threshold. Bits are allocated to reduce the audible distortion the most.).

Therefore it would have been obvious at the time of the invention to choose a bit allocation based on the total distortion as taught by Najafzadeh with the coding method

of Subramaniam and Kawahara in order to provide an efficient encoder with minimal audible distortion.

25. Consider claim 13, Subramaniam teaches the apparatus of claim 12, wherein the quantization noise attenuator calculates a number of bits corresponding to a predetermined bit rate determined for compression of an audio signal (this is inherent in a perceptual coder as taught in figure 4), sets the number of bits with the adjustment of a common gain until a number of bits smaller than the calculated number of bits are used for coding (Figure 4, step 35 global gain is initially set, step 40, global gain is reduced if bits needed is greater than amount allocated.), and adjusts a scale factor band gain to adjust a degree to which quantization noise is attenuated in the plurality of frequency bands (Figure 4, Block 21, scale band factors are adjusted where distortion is greater than the mask.).

26. Consider claim 14, Najafzadeh teaches the apparatus of claim 12, wherein the band selective quantization noise attenuator adjusts a scale factor in a predetermined number of frequency bands of the plurality of frequency bands according to a ranking of noise-to-mask ratios of scale factor band gains of the predetermined number of frequency bands in which the quantization noise of the quantized MDCT coefficient is greater than the quantization noise threshold in the psychoacoustic model (Page 895, the section titled "total audible distortion technique" discusses allocating bits to each band depending on how much it reduces the total distortion. In this way bits are

obviously allocated to bands with the greatest noise to mask ratios in order to reduce the overall distortion by the greatest amount.).

27. Consider claim 16, Subramaniam in view of Kawahara teaches the method of claim 1, however does not specifically teach that the differences are first differences which are relatively larger than second differences between the predetermined quantization noise threshold and the quantization noise energies of the quantized MDCT coefficients not in the predetermined number of frequency bands.

In the same field of audio coding, Najafzadeh teaches that the differences are first differences which are relatively larger than second differences between the predetermined quantization noise threshold and the quantization noise energies of the quantized MDCT coefficients not in the predetermined number of frequency bands (Page 895, the section titled "total audible distortion technique" discusses allocating bits to each band depending on how much it reduces the total distortion. In this way bits are obviously allocated to bands with the greatest noise to mask ratios in order to reduce the overall distortion by the greatest amount.).

Therefore it would have been obvious to one of ordinary skill in the art to reduce the noise in the bands that would reduce the overall distortion the most as taught by Najafzadeh with the encoding method of Subramaniam in view of Kawahara in order to provide a more efficient encoder that produces the minimum audible distortion.

28. Consider claim 17, Subramaniam in view of Kawahara teaches computer-readable medium of claim 1, however does not specifically teach that the differences are first differences which are relatively larger than second differences between the predetermined quantization noise threshold and the quantization noise energies of the quantized MDCT coefficients not in the predetermined number of frequency bands.

In the same field of audio coding, Najafzadeh teaches that the differences are first differences which are relatively larger than second differences between the predetermined quantization noise threshold and the quantization noise energies of the quantized MDCT coefficients not in the predetermined number of frequency bands (Page 895, the section titled "total audible distortion technique" discusses allocating bits to each band depending on how much it reduces the total distortion. In this way bits are obviously allocated to bands with the greatest noise to mask ratios in order to reduce the overall distortion by the greatest amount.).

Therefore it would have been obvious to one of ordinary skill in the art to reduce the noise in the bands that would reduce the overall distortion the most as taught by Najafzadeh with the encoding method of Subramaniam in view of Kawahara in order to provide a more efficient encoder that produces the minimum audible distortion.

Conclusion

29. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure is included on the Notice of References PTO-892.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Douglas C. Godbold whose telephone number is (571) 270-1451. The examiner can normally be reached on Monday-Thursday 7:00am-4:30pm Friday 7:00am-3:30pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Patrick Edouard can be reached on (571) 272-7603. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

DCG

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PRIMARY EXAMINER